

What is Claimed is:

1. A wireless communication system, the system comprising:  
a plurality of packet transceiver systems, each transceiver module located  
5 at one of a plurality of cell sites in said wireless communication system, each of said first  
transceiver modules communicatively coupled to a hub via a first transport  
communication medium and configured to receive RF radio signals over a wireless link  
and process the received RF signals to produce packetized demodulated bit streams for  
transmission over the first transport communication medium;  
10 a hub comprising:  
at least one traffic consolidator unit (TCU) configured to receive  
the packetized demodulated bit streams transmitted by the packet transceiver systems via  
the first transport communication medium and process the received packetized  
demodulated bit streams to reproduce the RF radio signals transmitted over said wireless  
15 link;  
a base transceiver station (BTS) communicatively coupled to said  
second transceiver module and configured to process the reproduced RF radio signal to  
produce a T1/E1 signal; and  
a mobile switching office (MSO) in communication with the hub  
20 via a second transport communication medium and configured to receive and process the  
T1/E1 signal to produce a channelized circuit-switched T1/E1 signal.
2. The wireless communication system of Claim 1, wherein the first and  
second transport communication mediums are Ethernet over copper traffic flow.  
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3. The wireless communication system of Claim 1, wherein the first and  
second transport communication mediums are optical fiber rings.
4. The wireless communication system of Claim 3, wherein the optical fiber  
30 ring is a SONET/SDH ring.

5. The wireless communication system of Claim 3, wherein the optical fiber ring is a Gigabit Ethernet ring.

6. The wireless communication system of Claim 3, wherein the fiber optic  
5 ring is a 10 Gigabit Ethernet ring.

7. The wireless communication system of Claim 1, further comprising a plurality of remote cell site antennas disposed at said plurality of cell sites, said antennas coupled to said packet transceiver systems and configured to transmit said RF radio  
10 signal from mobile users over said wireless link to said packet transceiver systems.

8. The wireless communication system of Claim 8, wherein the cell site antennas are equipped with smart technology.

9. The wireless communication system of Claim 9, wherein the cell site  
15 antennas are configured to detect changes in RF capacity in the network.

10. The wireless communication system of Claim 1, wherein each packet transceiver system further comprises:

20 an RF front end module configured to receive an RF signal, down-convert the received RF signal and forward the down-converted RF signal to an A/D module;

a programmable antenna card (PAC) configured to demodulate an RF signal to extract a digital bit stream;

a plurality of Input/Output (I/O) modules;

25 a control and switching module configured to manage operations within the first transceiver unit;

an integrated test and performance module configured to collect network performance data to facilitate network installation and troubleshooting;

30 a gigabit Ethernet card configured to groom data traffic channels and control channels into GigE/RPR traffic flows in accordance with bandwidth requirements for the respective channels.

11. The wireless communication system of Claim 1, wherein the traffic consolidator unit comprises:

a control shelf comprising:

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a system control module;

an independent switching fabric;

an integrated test and performance monitoring card; and

a plurality of input/output (I/O) cards;

10 a bearer shelf configured to perform bearer channel processing, switching, testing, performance monitoring and transport.

12. The wireless communication system of Claim 11, wherein the traffic consolidator unit further comprises an application server shelf configured to support a plurality of customized software applications.

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13. The wireless communication system of Claim 12, wherein the customized software applications comprise:

20 a continuous network optimization (CNO) application for continuously monitoring network performance indicators and automatically provisioning sufficient bandwidth in response;

a testing/performance monitoring application and a network rerouting application for facilitating near/far-end testing, setup, installation, and troubleshooting; and

a network re-routing application to automate spectrum and network optimization processes.

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14. The wireless communication system of Claim 13, wherein the network performance indicators are derived from the application processor and the integrated test and performance monitoring card.

15. The wireless communication system of Claim 13, wherein a local version the CNO application is resident in each of said packet transceiver systems and traffic consolidator units in the system.

5 16. The wireless communication system of Claim 13, wherein the CNO application is comprised of three sub-processes:

an RF capacity detection (RFCD) sub-process configured to determine if an increase/decrease in RF capacity is required in the network;

10 a network capacity detection and adjustment (NCDA) sub-process configured to utilize the RF capacity status information obtained from the RFCD sub-process to determine if an increase/decrease in network-side capacity is required in the network; and

a baseband processing distribution and adjustment (BPDA) sub-process configured to utilize the RF capacity and network status information obtained from the RFCD and NCDA processes to determine what level of baseband resources are required.

17. A method for transporting digital bit streams extracted from radio frequency (RF) signals between antennas and processing elements in a wireless communications network, the method comprising:

20 receiving a RF (Radio Frequency) signal at a packet transceiver system over a wireless link via an antenna, said first transceiver located at one of a plurality of remote cell sites;

processing the received RF signal at said packet transceiver system to produce a packetized demodulated bit stream supporting serial transmission of the bit stream over a first transport communication medium;

25 transmitting the bit stream over the first transport communication medium to a traffic consolidator unit located at a hub in the network;

upon receipt of the transmitted bit stream at the traffic consolidator unit, processing the received bit stream at the traffic consolidator unit to re-produce the RF signal received at the packet transceiver system;

providing the reproduced RF signal as an input to a base transceiver station (BTS) located at said hub;

processing the reproduced RF signal at the BTS to produce a T1/ E1 signal;

5 providing the T1/E1 signal as an input to the traffic consolidator unit;  
packetizing the T1/E1 signal at the traffic consolidator unit to produce a packetized T1/E1 signal;

transmitting the packetized T1/E1 signal over a second transport communication medium to a mobile switching office (MSO); and

10 upon receipt of transmitted bit stream at the MSO, processing the received packetized T1/E1 signal to produce a channelized circuit-switched T1/E1 signal.

18. The method according to Claim 17, wherein the RF signal is transmitted from a mobile station over the air to the first transceiver unit via a fixed RF antenna  
15 device.

19. The method according to Claim 17, wherein the first and second transport communication mediums are one of a fiber optic link and a high-speed copper pair(s).

20 20. The method according to Claim 17, wherein the act of processing the received RF signal at the packet transceiver system, further comprises the acts of:

demodulating the RF signal to extract bit information;

constructing said packetized demodulated bit stream in accordance with a digital packet transport protocol;

25 prioritizing said packetized demodulated bit stream in accordance with pre-determined policies;

optionally routing said prioritized and packetized demodulated bit stream in accordance with applied policies;

30 applying said policies to automatically adjust bandwidth utilization parameters and baseband processing capacity based on real-time network conditions.

21. The method according to Claim 20, further comprising inserting transit priority coding based on said prioritization.

22. The method according to Claim 20, wherein said, policies are created for  
5 scheduled and unscheduled localized events and for loss of network resources.

23. The method according to Claim 22, wherein said policies are managed by a policy management module configured to receive network status information from a CNO application and responsively issue requests for network changes to the CNO  
10 application.

24. A method for automatically adjusting network bandwidth in response to a change in RF activity in the network, the method comprising:

monitoring a plurality of network parameters related to RF capacity;  
15 determining if an increase/decrease in RF activity has occurred based on said monitored parameters; and  
automatically adjusting the bandwidth between one of the following sites, Cellsite and hub, Hub to MSO, hub to hub or MSO to MSO.

20 25. The method of Claim 24, wherein the plurality of network parameters comprise: a first parameter for monitoring an RF signal after conversion to a digital signal, a second parameter for monitoring an RF front end and/or antenna presence, a third parameter for monitoring all active carriers, a fourth parameter for monitoring active/idle network channels, a fifth parameter for monitoring a network congestion level  
25 and a sixth parameter for monitoring event triggered alarms.